



United States  
Department Of  
Agriculture

Forest  
Service

Shasta-Trinity  
National Forests

Lat 40.62503 Lon -123.57759

Reply To: 3420

Date: December 10, 1992

Subject: Biological Evaluation of Pests in Two Stands in  
Proposed Pilot Creek Sale, Mad River RD (FPM Rept. N92-11)

To: Forest Supervisor, Six Rivers NF

On November 10, 1992 David Schultz, entomologist, and I visited two stands in the proposed Pilot Creek sale with Roger Moore, Mad River Ranger District. Both of these stands are being used by Roger for silvicultural certification.

Stand 105 is a 19 acre red fir stand that is along Forest Highway 1 (T. 3 N., R. 5 E., section 23). In addition to red fir, sugar pine is a significant component of the overstory. Nearer the bottom of the stand along the west boundary, there is also Douglas-fir and ponderosa pine. Stand structure varies, with larger red fir and some sugar pine in the overstory in most of the stand. Small openings are present in the overstory. Advance regeneration of red fir also occurs in pockets. The age of the overstory is approximately 130 years. The site has been determined to be a Forest Service Site Class 3.

The principal disease organism in the red fir is dwarf mistletoe, Arceuthobium abietinum f.sp. magnificae. Overstory trees have dwarf mistletoe ratings in classes 4 to 6, indicating severe levels of infection. Infections are also present in some of the understory red fir. The presence of these levels is leading to top-kill and tree mortality of some of the red fir. Mortality also involves attacks by the roundheaded fir borer, Tetropium abietis, and possibly fir engraver, Scolytus ventralis. In addition to these three organisms in the red fir, Heterobasidion annosum, cause of annosus root disease, conks were found in old red fir stumps. No above ground damage or symptoms were observed in living trees, however. The overstory sugar pine is relatively healthy, although some branch flags were present. Understory sugar pine had infections of their branches or bole by white pine blister rust, caused by Cronartium ribicola. The branch flags in the overstory trees also could have been caused by this fungus.

The primary management objective for this stand is to maintain furbearer habitat, specifically pine marten and fisher. The most aggressive approach to deal with the dwarf mistletoe is to plan a regeneration harvest that removes the overstory and regenerates a mix of species. The management objective conflicts with this direct approach. Dwarf mistletoe-infested true fir stands can be managed in other ways, however, to maintain their health. The principal means of doing this is to avoid creating a multiple layer stand structure. Leaving dwarf mistletoe in the upper layers of a stand with susceptible trees beneath will result in heavy infection of the understory, resulting in stunting, deformities and poor replacement trees for the overstory.





The proposed prescription for this stand is to remove most of the overstory, but retaining the sugar pine and some red fir. The advanced regeneration would also be left and be precommercially thinned. Any holes in the stand would be planted with a mix, possibly of red fir, sugar pine, Douglas-fir, ponderosa pine, and white fir. The overstory red fir that are retained would eventually be girdled to eliminate the source of overstory dwarf mistletoe infection.

This prescription could provide a future stand that is not significantly affected by dwarf mistletoe. There are some risks, however. A major one is the assurance that the residual overstory red fir are removed or killed within 10-15 years. If these trees survive on the site, the advanced regeneration and any planted red fir will eventually become severely infected and will develop into a stunted, slow growing future stand. A second risk is leaving the advanced regeneration red fir, some of which will be infected, and planting red fir adjacent to it in openings. This provides an uneven height situation with dwarf mistletoe being in the taller size class. The adverse effect of this structure may be reduced by decreasing the proportion of red fir planted immediately surrounding areas of advanced regeneration. Delaying precommercial thinning may also provide some benefit. Dwarf mistletoe responds positively to increased light following thinning by increasing shoot and seed production. The reduced number of tree stems that would exist following thinning would reduce the amount of mistletoe seed intercepted. Both of these factors means that following precommercial thinning more seed may be available to infect planted red fir as they increase in size. Delaying precommercial thinning for 5 or more years following overstory removal may permit planted red fir to begin some height growth and reduce the height difference with the advance regeneration.

The long-term effect of dwarf mistletoe on this stand can be reduced by planting only non-host species. There will still be a large component of red fir in the stand from the advance regeneration and natural regeneration that will occur. Species to consider for planting include white fir, ponderosa pine, Douglas-fir, and sugar pine. Sugar pine stock should come from rust resistant trees since blister rust is common in the area and would likely be severe on non-resistant seedlings planted within small openings.

The second stand we visited is in unit 33W of the same proposed sale (T. 2 N., R. 5 E., sections 2, 10, 11). This is a lower elevation second-growth Douglas-fir/black oak stand. The proposed prescription for this stand is a commercial thinning to improve stand growth and vigor and to maintain much of the oak. The oak is slowly declining as the Douglas-fir increasingly dominates the canopy.

Numerous dead black oaks were observed. Most of them had rhizomorphs of Armillaria sp. under their bark. This is not unusual and does not indicate that Armillaria root disease is active in the stand. There are several species of this fungus which are either not pathogenic or only weakly pathogenic on severely stressed trees. Most likely, Armillaria in this situation invaded the oaks as they were dying or already dead because of suppression. No evidence of pathogenic activity was observed.





Some of the Douglas-firs were also showing signs of stress or decline. These had evidence of attack by fir flatheaded borer, Melanophila drummondi. This insect lays eggs in the bark crevices. The larvae that develop attempt to bore into the phloem and cambium. A vigorously growing tree can outgrow the insects and suppress their activity. However, when a tree is under stress, such as from lack of moisture, the larvae can be successful and girdle the cambium. Sufficient numbers of attacks can lead to tree decline and eventual mortality. The trees in this stand, although relatively healthy, are under stress from the continuous drought and the high stocking levels that are present. Reducing the basal area in this stand will benefit the residual trees and make them less susceptible to this insect.

Black stain root disease, caused by Leptographium wagneri f.sp. pseudotsugae, was observed killing Douglas-firs in one area of the stand. It was observed in all size classes from seedling to mature trees. This fungus is host-specific to Douglas-fir and is vectored by root feeding insects. It is usually associated with site disturbance. Entering this stand may increase the incidence of the disease. Certain management activities can be employed to reduce the likelihood of new centers of this disease becoming established. The primary result desired from these activities is to reduce site disturbance. They are listed in order of preference as far as effectiveness.

- 1) Employ a cable harvesting system to remove logs from the site, preferably a skyline system.
- 2) Minimize skid trails and require endlining to the skid trails.
- 3) Remove injured and damaged trees from along skid trails.
- 4) Harvest in mid to late summer when soils are dry and likelihood of compaction is lowest.
- 5) Plan harvest for period from July 1 to September 15 when principal insect vectors are not flying.
- 6) Remove or destroy all green Douglas-fir slash before the next growing season after harvest.

This stand should be monitored following harvest for new infections of black stain root disease. Information gathered from this sale can be used for similar stands that may be treated in the surrounding area.

If you have any questions on this report or would like additional assistance, I can be contacted at (916) 246-5101.

GREGG DeNITTO  
Forest Pathologist  
FPM Northern CA Service Area

